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(54) Title: THERMAL TRANSFER RECORDING DEVICE

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[There are no amendments to this patent application.]

Detailed explanation of invention

Technological field of invention

The present invention concerns a thermal transfer recording device using a thermal transfer ribbon for word processors, etc.

Technological background and problems to be solved by the invention

Recently, in printers for word processors, etc., a thermal transfer ribbon obtained by coating thermally fusible inks on one side of a thin film has been overlaid with plain paper, with thermal fusion printing being carried out on a platen by transfer of the ink from the ribbon onto the plain paper in a thermal transfer recording device using a thermal head. However, in such an operation, low-cost quiet recording is carried out on plain paper in a small device, but a thin (10-50 μm) and wide (210-300 cm) thermal transfer ribbon is used, thus during ribbon transport or ribbon roll manufacture, the ribbon may become wrinkled. Such wrinkles on the ribbon prevents close contact of the transfer paper and thermal transfer ribbon held between the platen and the thermal head, which may result in a missed print [transfer] and thermal head damage by overheating.

Objectives of the invention

Under such circumstances, it is an objective of the present invention to provide a thermal transfer recording device causing no wrinkling of the thermal transfer ribbon, for improved contact between the thermal transfer receptor and thermal transfer ribbon with no missing prints and thermal head damage due to overheating.

Outline of the invention

The present invention is characterized in that, in a thermal transfer recording device for transfer recording on a transfer receptor by operating a thermal head while the transfer receptor is in close contact with the thermal transfer ribbon having thermal-transfer ink on one side, the device is fitted with a part that guides the thermal transfer ribbon and a wrinkle stretching means for stretching the wrinkles by imparting tension to the thermal transfer ribbon on the guide.

Application example of invention

Next, an application example of the present invention is explained with Figures 1 and 2. Figure 1 shows an elastic rubber platen (1) operated by the motor (2), with the platen peripheral surface being pressed against first guide roll (3), thermal head (4), and second guide roll (5), in that order. The thermal transfer ribbon (6) is inserted along the peripheral surface of the platen (1), passing between the platen (1) and first guide roll (3), thermal head (4), then second guide roll (5). The thermal transfer ribbon (6) that had been coated with a thermal transfer ink on the back side, i.e., the platen (1) side, is released from the release reel (7) and wound on the winding reel (8) via third roll (9).

A loader (10) contains a stack of transfer receptor paper (P). The transfer paper (P) inside the loader (10) is fed from the top by the paper feed roll (11), between the platen (1) and thermal transfer ribbon (6) via first guide plates (12, 12). The transfer paper (P) passed between the platen (1) and thermal transfer ribbon (6) is discharged into the collection tray (15) by the paper discharge roll (14, 14) via the second guide rolls (13, 13).

The release reel (7) is braked as needed to maintain a constant tension of the thermal transfer ribbon (6) by the thermal head (4) while it is between the printing part of the thermal transfer paper (P) and the release reel (7), so that wrinkling is prevented. Also, between the parts described above, the thermal transfer ribbon (6) is held widthwise by the fourth guide roll (16) and wrinkle stretching roll (17) as a means for stretching the wrinkles. As shown in Figure 2, the wrinkle stretching roll (17) is on the back side (film support side) and the fourth guide roll (16) is on the surface side of the thermal transfer ribbon (6); they rotate in the same direction. The fourth guide roll (16) has a smooth surface, and the wrinkle stretching roll (17) made of foamed urethane rubber has symmetric spiral undulations (18) on the surface, divided at the axial center part, resulting in forced stretching of the thermal transfer ribbon (6) by rubbing action. Operating force transmission system (19) is shown.

With the print command of word processors, computers, etc., with the rotation of paper feed roll (11), the transfer paper (P) on the top in the loader (10) is fed. As the front end of the transfer paper (P) is picked up between the thermal transfer ribbon (6) and platen (1), at a certain timing, the operating motor (2) is activated to rotate the platen (1); at the same time, winding reel (8), first guide roll (3), second guide roll (5) and paper discharge roll (14, 14) start to rotate. As a result, the transfer paper (P) and thermal transfer ribbon (6) in the overlaid state are moved to the holding part by the platen (1) and thermal head (4). As the transfer paper (P) reaches the printing area of thermal head (4), thermal printing by the thermal head (4) occurs while in close contact. The ink on the thermal transfer ribbon (6) is melted and transferred to the transfer paper (P). As the front end of the transfer paper (P) reaches the second guide roll (5), the transfer paper (P) is separated from the used thermal transfer ribbon (6), and the transfer paper (P) is discharged onto the collection tray (15) by the paper discharge roll (14, 14).

While wrinkle formation is suppressed by maintaining a constant tension of thermal transfer ribbon (6) before the transfer paper (P) reaches the printing area by the thermal head (4), existing wrinkles and wrinkles to be formed are forcibly stretched by the wrinkle stretching roll (17). Namely, as the wrinkle stretching roll (17) is rotated with rubbing, the peripheral spiral undulations (18) move from the center part to either end in the rubbing part to the thermal transfer ribbon (6), imparting tension to the thermal transfer ribbon (6). Namely, as shown by arrows (A, B), the friction force generated stretches the thermal transfer ribbon (6) toward either end, with forcible removal of wrinkles. Thus, there are no wrinkles in the thermal transfer

ribbon (6) during printing by the thermal head (4) in close contact with the transfer paper (P), resulting in no missed prints and no damage to the thermal head (4) by overheating. Since the wrinkle stretching roll (17) is made of sufficiently soft foamed urethane rubber, even upon rotating with rubbing, the thermal transfer ribbon (6) is not damaged. Furthermore, since the wrinkle stretching roll (17) rubs against the back side, i.e., ink-free side, of the thermal transfer ribbon (6), the wrinkle stretching roll (17) is not soiled by the ink of the thermal transfer ribbon (6).

The wrinkle stretching means may be any one shown in Figures 3-6. Namely, in Figure 3, a pair of the wrinkle stretching rolls (20, 20) is placed at either end of the thermal transfer ribbon (6), with spiral undulations (18) having the inner end part rotating toward the front more than the outer ends being formed on the back side of wrinkle stretching rolls (20, 20). Figure 4 has wrinkle stretching roll (22) with hair brush (21) for the wrinkle stretching roll (17) undulations of the example shown in Figure 2. In Figure 5, a pair of the wrinkle stretching rolls (24, 24) with rotating shafts (23) being tilted against the length direction of the thermal transfer ribbon (6) and placed with a gap in the center part in the width direction of the thermal transfer ribbon (6) -- rotate in opposite directions. In Figure 6, two pairs of the wrinkle stretching rolls (24) of Figure 5 are installed. Even with such variations, the effects obtained are similar to those of Figure 2.

The guide is not limited to the four guide rolls; it can be a guide plate, platen, etc.

Furthermore, as shown in Figures 7 and 8, the wrinkle stretching rolls (16A, 17A) are both driven rolls. The wrinkle stretching roll (17A) has elastic surface undulations (18A). One end of the rotating shaft is fitted with a braking mechanism consisting of a brake pad (30B) with brake shoe (30A) pressed by a support sprint. Similar effects are realized. Upon rotation, contact of the undulations (18A) with roll (16A) and ribbon (6) expands gradually. Even with such a constitution, the wrinkles are stretched, and the brake can be replaced by the friction force of the bearing.

Effects of the invention

As explained above, according to the present invention, in a thermal transfer recording device for transfer recording on a receptor by a thermal head operation on a transfer receptor in close contact with a thermal transfer ribbon installed with a thermal transfer ink on one side, the device is fitted with parts for guiding the thermal transfer ribbon and a means for stretching wrinkles by imparting a tension to the thermal transfer ribbon on the guide, resulting in the removal of wrinkles from the thermal transfer ribbon and improvement of contact between the transfer receptor and thermal transfer ribbon, with prevention of missed prints and damage to the thermal head by overheating.

Brief explanation of the figures

Figures 1 and 2 show a first example of the present invention. Figure 1 is a cross-sectional diagram illustrating the schematic constitution. Figure 2 shows the key parts. Figure 3 is a diagram showing the key parts of the second example. Figure 4 is a diagram showing a third example of the present invention. Figure 5 is a diagram showing a fourth example of the present invention. Figure 6 is a diagram showing a fifth example of the present invention. Figure 7 is a diagram showing a sixth example of the present invention. Figure 8 is a diagram showing the key parts of the example of Figure 7.

4	thermal head
6	thermal transfer ribbon
P	transfer receptor (transfer paper)
16	guide (fourth guide roll)
17	wrinkle stretching means (wrinkle stretching roll)
18	undulations
20	wrinkle stretching means (wrinkle stretching roll)
21	hair brush
22	wrinkle stretching means (wrinkle stretching roll)
24	wrinkle stretching means (wrinkle stretching roll)
16A	wrinkle stretching means (wrinkle stretching roll)
17A	wrinkle stretching means (wrinkle stretching roll)
18A	undulations

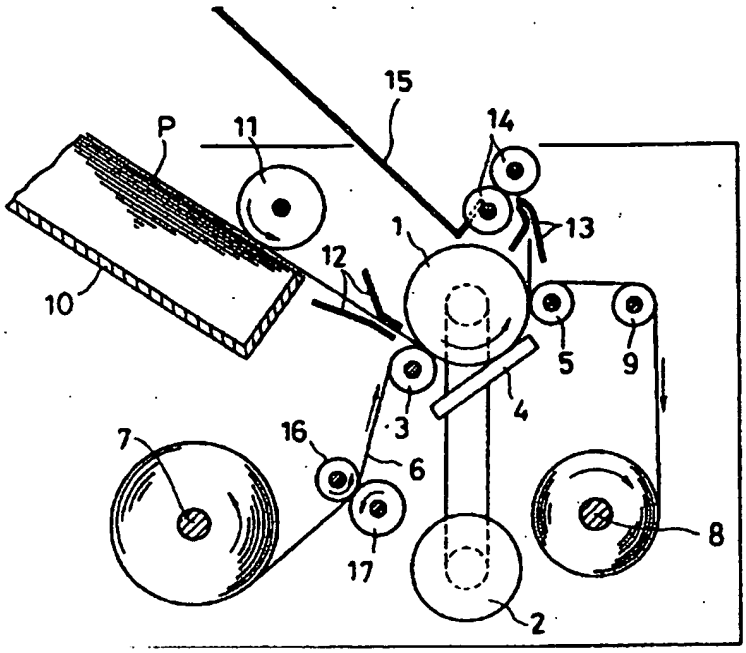

Figure 1

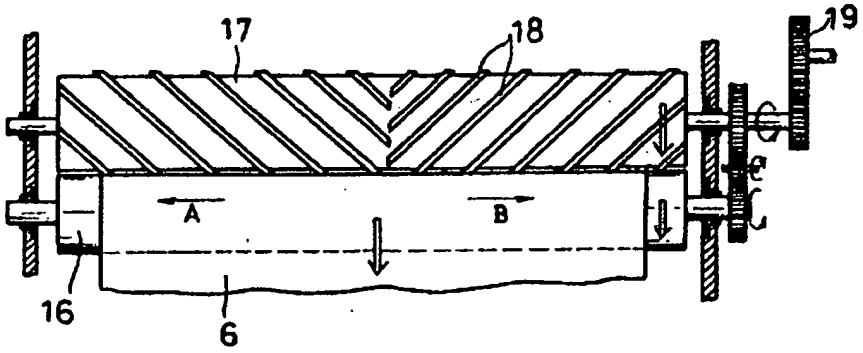

Figure 2

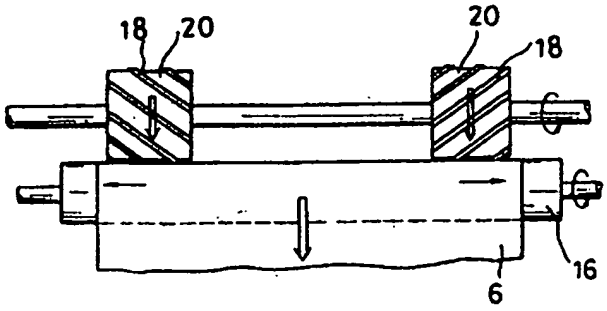

Figure 3

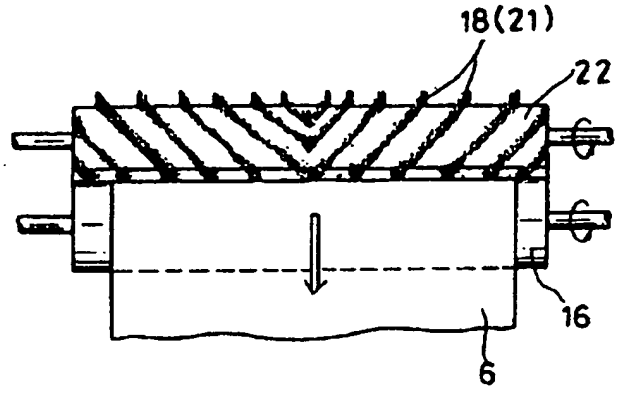

Figure 4

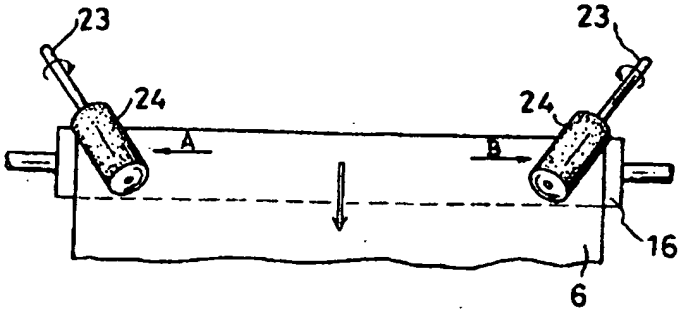

Figure 5

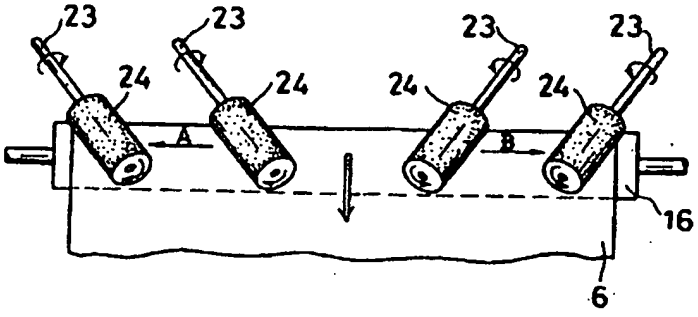

Figure 6

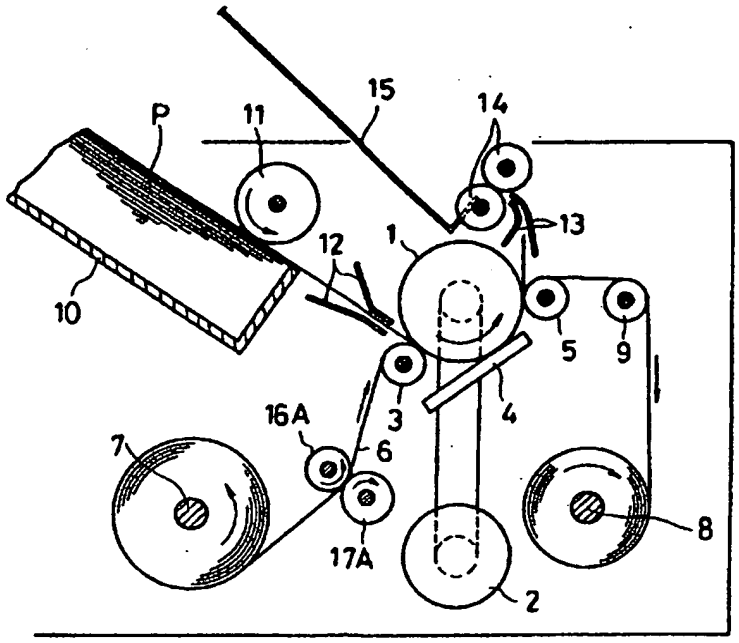

Figure 7

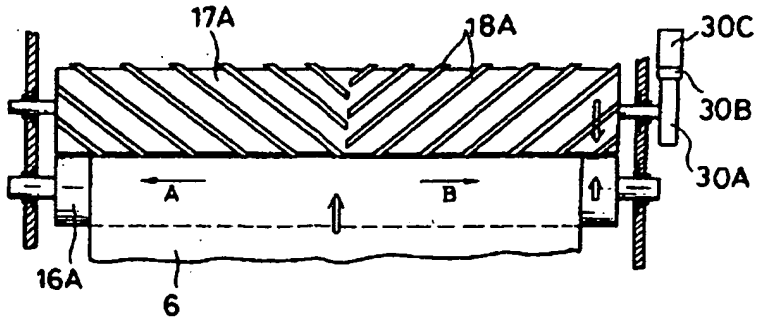

Figure 8